

Ms. Nagra

Date:

Name:

Block:

# SCIENCE 10

Ms. Nagra

# Safety in the Science Classroom Page 1

1. Never begin an experiment or lab without your teacher's permission.
2. Read and study the procedure from start to finish before beginning any experiment. If you have any questions, ask your teacher. Make sure you understand any safety symbols on materials you will be using, and the hazards they represent. Follow the procedure exactly as specified.
3. Always wear safety goggles throughout a lab that requires chemicals. Keep the goggles on for as long as there are any chemicals being used by anyone in the lab. Do not take your goggles off or move them from your eyes (for example, to write down observations) at any time during the lab. Wear other safety equipment, such as aprons, gloves, lab coats, as required.
4. Never eat or drink anything in the lab. Do not chew gum during labs.
5. Never inhale chemicals. Use the "wafting" technique if you need to smell a chemical. Do not taste any substances or draw any material into a tube with your mouth.
6. If you are taking chemicals from one container and putting them into smaller containers, make sure you label all the containers.
7. When pouring liquids hold the containers away from your face. Put test tubes in a test tube rack before pouring liquids into them.
8. Use only Pyrex or Kimax glass containers when heating. Never use chipped or cracked glassware. Never allow a container to boil dry.
9. Report all chemical spills to your teacher. All chemical spills must be cleaned up completely and immediately. Wipe up any splashes or spills of water immediately.
10. Use test tube holder and always slant test tubes away from yourself and others when heating them. Keep materials away from flames. Follow all instructions for using Bunsen burners carefully.
11. Take caution with hotplates -- you can't tell by looking if they are hot, but they can remain hot for up to one hour after being turned off. To see if one is still hot, don't touch it! Instead, carefully put a drop of water on it's surface. If the water bubbles or boils, the hot plate is too hot to touch!

## Safety in the Science Classroom Page 2










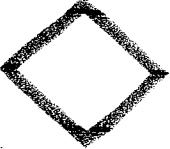









12. Make sure your hands are dry when using electrical equipment. Unplug electrical cords by pulling on the plug, not the cord. Don't use equipment with frayed wires or cords. Report any defective equipment or outlets to your teacher.
13. When cutting materials, follow the following guidelines:
  - Do not cut anything with a scalpel or razor blade by holding it in one hand while cutting it with the other. Always put the item down (for example, into a dissecting tray) on a flat surface. Hold it down with pins or clamps, not your fingers.
  - Always cut away from yourself and away from others when using a scalpel.
  - When walking with or handling over a scalpel or sharp or pointed object, keep the sharp or pointed surface facing the floor away from others when using a scalpel.
14. Tie back long hair and loose clothing.
15. When holding a bottle from which you are going to pour chemicals, keep the label against the palm of your hand. If everyone does this, any drips will only touch the opposite side of the bottle, and not get on your hand.
16. When diluting acid, always add small amounts of acid to large amounts of water.
17. Know the location and proper use of the fire extinguisher, safety shower, fire blanket, first aid kit, and fire alarm.
18. If your clothing catches on fire, smother it with the fire blanket or a coat. "Stop, Drop, and Roll" NEVER RUN.
19. Report any accident or injury, *no matter how small*, to your teacher.
20. When cleaning up, be sure to:
  - Turn off gas if it was used.
  - Disconnect electrical apparatus.
  - Return all materials to their proper places.
  - Do not return unused chemicals to the original containers. Your teacher will tell you what to do with the unused chemicals and how to dispose of any other materials. Never pour unused chemicals down the drain without permission from your teacher.
  - Place any broken glass in the container(s) reserved for broken glass. Do not put broken glass in the regular garbage.
  - Clean and dry your work area. Do not leave water on the counter or floor
  - The last thing you should do after a lab is wash your hands with soap and water.

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## 







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The warning symbols on household products were developed to indicate exactly why and to what degree a product is dangerous.

		poison	flammable	explosive	corrosive
					
danger					
warning					
caution					

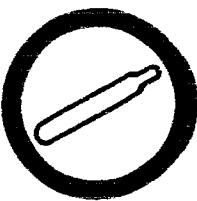

### 



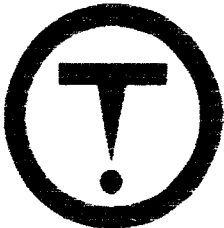
The Workplace Hazardous Materials Information System (WHMIS) symbols were developed to standardize the labelling of dangerous materials used in all workplaces, including schools. Pay careful attention to any warning symbols on the products or materials that you handle.

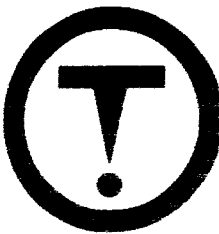



	compressed gas		dangerously reactive materials		oxidizing material		poisonous and infectious material causing immediate and serious toxic effects
	flammable and combustible material		biohazardous infectious material		corrosive material		poisonous and infectious material causing other toxic effects

# WHMIS Symbols

The shapes of the symbols used on labels have been chosen to show the nature of the hazard they represent.













<p><b>Class A</b></p>	<p><b>COMPRESSED GAS</b></p> <ul style="list-style-type: none"> <li>• It is a gas kept under pressure.</li> <li>• Heat may cause the container to <u>explode</u>.</li> <li>• A drop or impact may cause the container to explode. E.g. steel cylinders of acetylene, oxygen, hydrogen, helium, chlorine, nitrogen, neon, argon etc. and fire extinguishers.</li> <li>• Compressed gases can be hazardous simply because they are under high pressure, and the gas itself can also be hazardous (like chlorine gas). If the gas itself is hazardous, it will have other appropriate hazard symbols along with the compressed gas symbol.</li> <li>• Handle with care, do not drop.</li> <li>• Keep away from heat or potential sources of ignition. Store in a designated area. Large cylinders must be properly secured with a chain.</li> </ul>	
<p><b>Class B</b></p>	<p><b>FLAMMABLE AND COMBUSTABLE MATERIALS</b></p> <ul style="list-style-type: none"> <li>• The material is a potential fire hazard. It may burn at relatively low temperature. Sparks, flame or friction could ignite it.</li> <li>• May burst into flame spontaneously in air or release a flammable gas on contact with water.</li> <li>• Keep any of these materials away from heat sources and other combustible materials. Never smoke when working with or near the materials. Store in a cool, fire-proof area.</li> </ul> <p><b>Division 1: Flammable Gases:</b> E.g. hydrogen, methane, propane.</p> <p><b>Division 2: Flammable Liquids</b> Flashpoint less than 37°C. These liquids catch on fire easily and have highly flammable fumes. E.g. gasoline, ethanol, methanol, diethyl ether.</p> <p><b>Division 3: Combustible Liquids:</b> Flashpoint &gt; 37°C E.g. diesel fuel, kerosene. These are less easily ignited than flammable liquids.</p> <p><b>Division 4: Flammable Solids:</b> E.g. magnesium, sodium, beryllium.</p> <p><b>Division 5: Flammable Aerosols:</b> E.g. most aerosol cans contain flammable propellants, also butane, propane in aerosol containers.</p> <p><b>Division 6: Flammable Reactive Materials:</b> Materials that could spontaneously ignite in air (celluloid, lithium aluminum hydride) or in water (sodium).</p>	

Class C	<p><b>OXIDIZING MATERIALS</b></p> <ul style="list-style-type: none"> <li>• The material is a fire or explosion risk near flammable or combustible material. May <u>burn</u> skin or eyes on contact.</li> <li>• An oxidizing material may or may not burn itself, but will release oxygen or another oxidizing substance, and thereby causes or helps a flammable or combustible material to burn. E.g. sulfuric acid, perchloric acid, hydrogen peroxide, sodium peroxide, benzyl peroxide, permanganates, dichromates, perchlorates, chlorine and bleach.</li> <li>• Keep the material away from combustible materials and store in designated areas. Keep the material away from sources of ignition. Never smoke when working near the material.</li> <li>• Wear proper protective equipment, including eye, face and hand protection and protective clothing.</li> </ul>	
Class D	<p><b>POISONOUS AND INFECTIOUS MATERIAL</b></p> <ul style="list-style-type: none"> <li>• The material is a potentially fatal poisonous substance. It may be fatal or cause permanent damage if it is inhaled, swallowed or absorbed through skin. May burn skin or eyes on contact.</li> </ul> <p><b>Division 1: Materials Causing Immediate and Serious Toxic Effects.</b></p> <ul style="list-style-type: none"> <li>• These materials are <i>immediately dangerous</i> to life and health. They can kill you fast!</li> <li>• Handle the material with extreme caution. Avoid contact with the skin or eyes, use proper protective clothing.</li> <li>• Avoid inhaling by working in well-ventilated areas. Wear respiratory equipment.</li> <li>• Wash and shower thoroughly after using.</li> <li>• Store in designated areas only.</li> </ul> <p><b>Division 2: Materials Causing Other Toxic Effects</b></p> <ul style="list-style-type: none"> <li>• The material is poisonous but not immediately dangerous to health. It may cause death or permanent damage as a result of repeated exposure over time. Usually the effects result from repeated exposure to the substance in the workplace over a long period of time. E.g. repeated exposure to benzene, asbestos.</li> <li>• Includes materials that can cause immediate irritation (to the eyes, skin, or lungs).</li> </ul>	  

<p><b>Class D</b> <b>Division 2</b> <b>continued</b></p>	<ul style="list-style-type: none"> <li>• Includes materials that can cause ill health effects that are not immediate; such as allergies, asthma, cancer, organ damage, birth defects, sterility, or other serious illness or disease.</li> <li>• Avoid skin and eye contact by wearing all protective equipment necessary including eye, face and hand protection and protective clothing.</li> <li>• Avoid inhaling by working in well-ventilated areas. Use respiratory equipment.</li> <li>• Store in designated areas.</li> </ul> <p><b>Division 3: Biohazardous Infectious material.</b> This includes organisms (like bacteria and viruses) and the toxins they may produce that are believed to cause disease. E.g. anthrax (in meat handling), salmonella, hepatitis B virus, AIDS virus, certain fungi and moulds, contaminated blood and pathogenic bacteria cultures, etc.</p>	  
<p><b>Class E</b></p>	<p><b>CORROSIVE MATERIAL</b></p> <ul style="list-style-type: none"> <li>• Caustic or acid materials that can eat through the skin or corrode metals like aluminum or steel. E.g. chromic acid, sulfuric acid, nitric acid, sodium hydroxide, hydrofluoric acid, some household cleaners, water treatment chemicals, photographic chemicals, lye.</li> <li>• This class also includes corrosive gases such as ammonia and the acids hydrogen fluoride, hydrogen chloride, hydrogen iodide and hydrogen bromide.</li> </ul>	
<p><b>Class F</b></p>	<p><b>DANGEROUSLY REACTIVE MATERIAL</b></p> <ul style="list-style-type: none"> <li>• Products which undergo dangerous reactions (such as polymerization, decomposition or condensation), when subjected to heat, pressure, shock or contact with water.</li> </ul> <p>Examples:</p> <ul style="list-style-type: none"> <li>• Plastic monomers such as butadiene undergo hazardous self-polymerization unless inhibitors are added,</li> <li>• Copper and mercury acydes, acetylides, ether, peroxides, benzyl peroxide, picric acid and isopropyl nitrates can be explosive under shock.</li> <li>• Calcium carbide reacts with water to release acetylene gas.</li> </ul>	

# International Hazard Symbols

- Not all products are controlled by the WHMIS legislation, and so they may not have WHMIS labels or use the exact same symbols as WHMIS. You'll see these other symbols on products you commonly find around the house and garden, including cosmetics (like hairsprays), pesticides, and some consumer and household products (like oven cleaners). These products use the International Hazard Symbols you see below.
- For your safety, you should be able to recognize these symbols and understand what hazards they represent.
- The following warning symbols used on labels are not controlled by WHMIS legislation:

	DANGER	WARNING	CAUTION
Poison			
Flammable			
Explosive			
Corrosive			

Note: The border that surrounds each symbol signifies the danger level of the hazard.

- An octagon (same shape as a stop sign) indicates "DANGER" and represents the most dangerous hazard.
- A four-sided diamond, indicates "WARNING" and represents a moderate or medium hazard level. A warning diamond does not pose as extreme a risk as the danger octagon.
- The upside-down triangle indicates "CAUTION" and represents the slightest or least hazard of the three borders. This does not make it harmless! Use these products with caution.



# Safety in the Science Classroom Exercise

For each of the following safety rules, give one GOOD reason why we have that safety rule.

- a) Never begin an experiment or lab without your teacher's permission.

**Sample Answer:**

**The teacher might have some important information you need to make the experiment work properly and safe.**

- b) Keep your safety goggles on as long as there are any chemicals being used in the lab, even if you yourself are finished.
- c) Never eat, drink, or chew gum during a lab.
- d) Put test tubes in a test tube rack before pouring liquids into them.
- e) Make sure your hands are dry when using electrical equipment.
- f) Report any injuries, no matter how minor, to your teacher.
- g) Always cut away from yourself and away from others when using a scalpel.
- h) When diluting acid, always add small amounts of acid to large amounts of water.
- i) If your clothing catches on fire, never run.
- j) When holding a bottle from which you are going to pour chemical, keep the label against the palm of your hand.
- k) If a chemical gets in your eye, flush it with running water for at least 15 minutes.

i)

Identify the following symbols, write down at least one hazard this symbol represents and give one example of a material or chemical that may have this symbol.



A



B



C



D



E



F



G



H

	Identify Symbol	One Hazard	Example
A			
B			
C			
D			
E			
F			
G			
H			

Identify the following International Safety Symbols.



A



B



C



D



E



F



G



H



I



J



K



L

- A \_\_\_\_\_
- B \_\_\_\_\_
- C \_\_\_\_\_
- D \_\_\_\_\_
- E \_\_\_\_\_
- F \_\_\_\_\_
- G \_\_\_\_\_
- H \_\_\_\_\_
- I \_\_\_\_\_
- J \_\_\_\_\_
- K \_\_\_\_\_
- L \_\_\_\_\_

Chemistry Safety Assignment

Name: \_\_\_\_\_

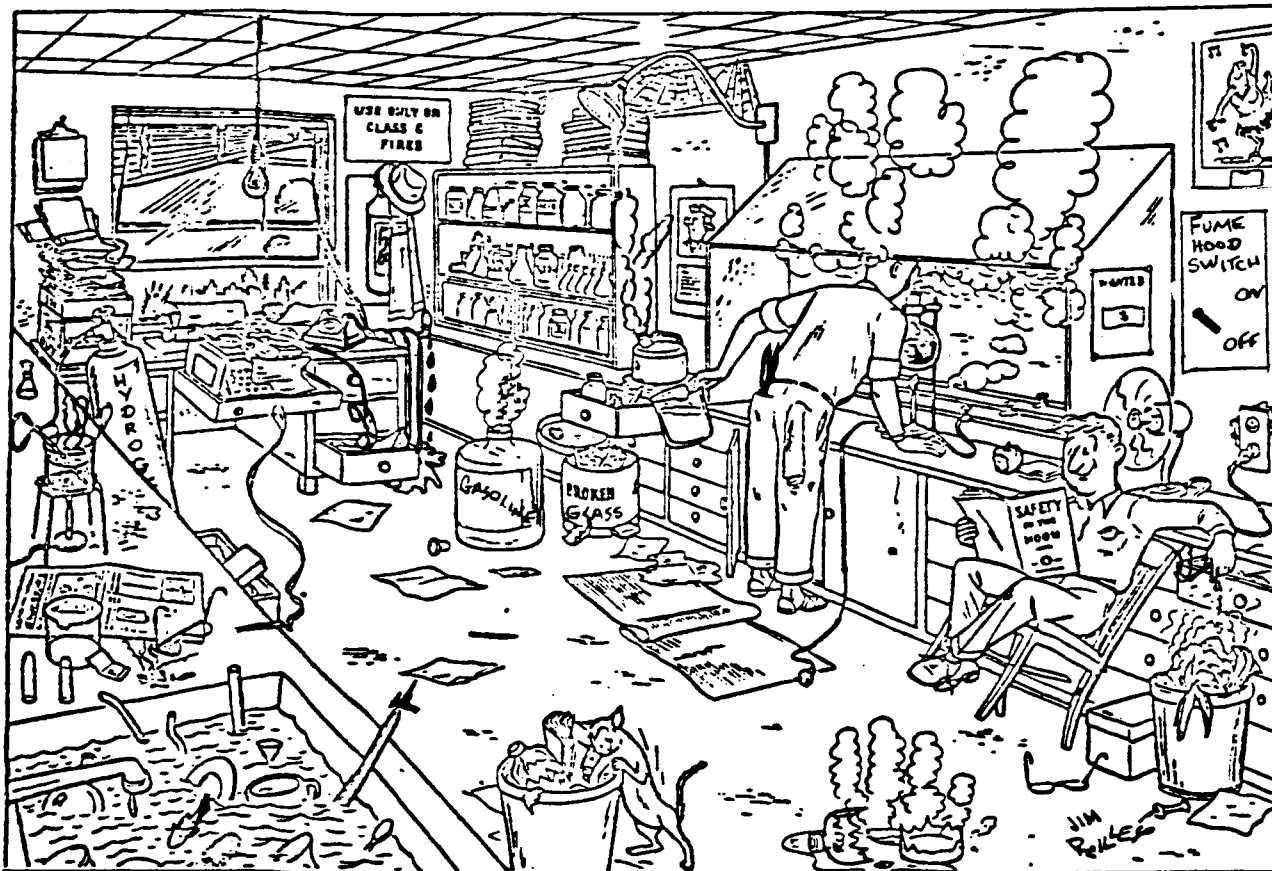
Instructions: List 10 unsafe conditions  
in the lab below.

Date: \_\_\_\_\_

Page: \_\_\_\_\_

Be specific.

ie: Test tubes by sink can easily fall down and break.



1)

2)

3)

4)

5)

6)

7)

8)

9)

10)

11)

12)

13)

14)

Name: \_\_\_\_\_

## Safety/Lab Equipment Scavenger Hunt

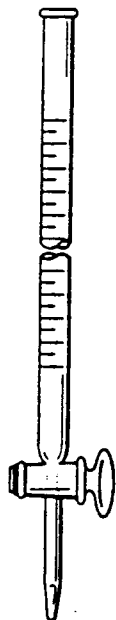
Find the following lab equipment in the classroom and record its location:

<u>Equipment</u>	<u>Location</u>
Test tubes	_____
Beakers	_____
Test tube racks	_____
Scoopulas	_____
Strikers	_____
Bunsen burners	_____
Eye droppers	_____
Test tube brushes	_____
Centigram balances	_____
Ring stands	_____
Rings	_____
Beaker tongs	_____
Graduated cylinders	_____
Funnels	_____
Erlenmeyer flasks	_____
Test tube holder	_____
Wire gauze/ Wire square	_____
Utility clamp	_____
Thermometer	_____

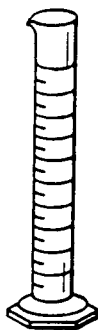
Find the following safety features in the classroom and record their location:

<u>Safety Feature</u>	<u>Location</u>
Eye wash station	_____
Fire extinguisher	_____
First-aid kit	_____
Master gas shut off valve	_____
Glass disposal bucket	_____
Flammable materials storage	_____
Paper towel dispenser (2x)	_____
Fume hood	_____

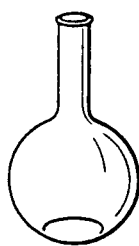
# COMMON LABORATORY EQUIPMENT



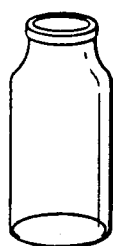
Buret



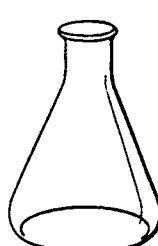
Graduated cylinder



Florence flask



Wide-mouthed bottle



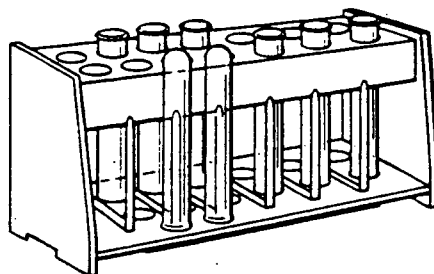
Erlenmeyer flask



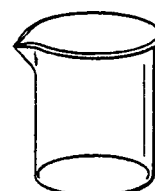
Filter flask



Thistle tube



Test tubes and rack



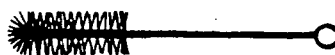
Beaker



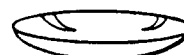
Funnel



Plastic wash bottle



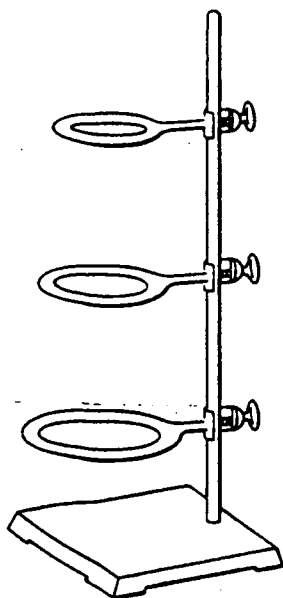
Test-tube brush



Watch glass



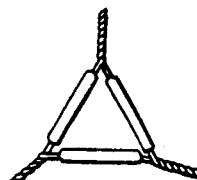
Condenser  
(water-cooled)



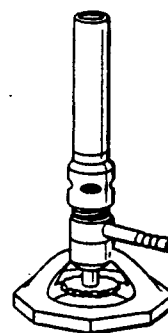
Ring stand (with rings)



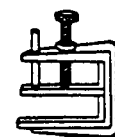
Wing top



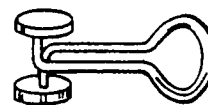
Triangle



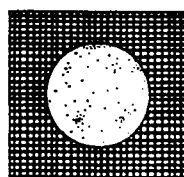
Burner



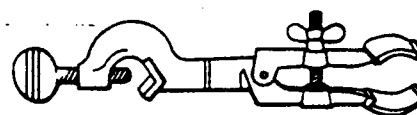
Screw clamp



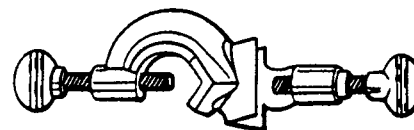
Pinchcock clamp



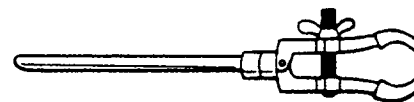
Wire gauze



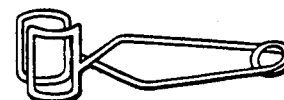
Buret (utility) clamp



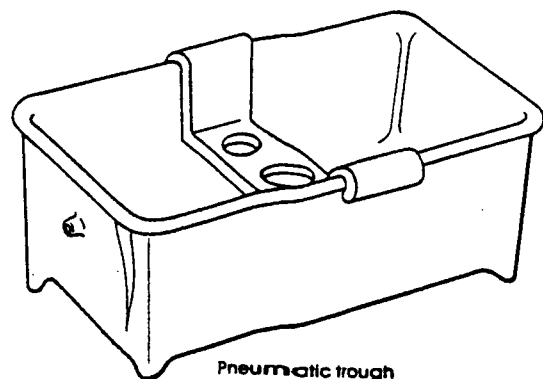
Clamp holder



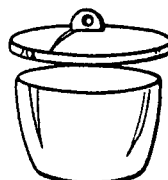
Extension clamp



Test-tube clamp



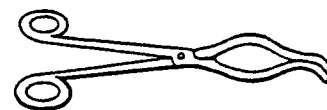
Pneumatic trough



Crucible with cover



Evaporating dish



Crucible tongs

SAFETY IN THE SCIENCE LABORATORY: EME VIDEO: 15 minutes NAME: \_\_\_\_\_

1. The foremost consideration in any safety program should be \_\_\_\_\_.
2. List three VERY OBVIOUS rules regarding chemicals and your mouth: \_\_\_\_\_  
\_\_\_\_\_ and \_\_\_\_\_.
3. What is the correct method for smelling a chemical? \_\_\_\_\_
4. Be sure that all containers of chemicals are properly \_\_\_\_\_.
5. Spills on the skin should be cleaned with \_\_\_\_\_ (for approximately five minutes).
6. Give two "hair care" safety considerations: \_\_\_\_\_ and \_\_\_\_\_.
7. What type of clothing can be dangerous? \_\_\_\_\_
8. Note THREE things the girl heating the test tube is doing for safety: \_\_\_\_\_  
\_\_\_\_\_ and \_\_\_\_\_.
9. Organic solvents (which are often VOLATILE) should be handled in a \_\_\_\_\_.
10. List THREE functions of the fume hood: removes \_\_\_\_\_ and \_\_\_\_\_ fumes and  
\_\_\_\_\_.
11. Acids should always be added \_\_\_\_\_.
12. What are the three basic eye protection devices? \_\_\_\_\_, \_\_\_\_\_ & \_\_\_\_\_.
13. A general rule is to wear eye protection when working with \_\_\_\_\_ or  
when \_\_\_\_\_ any substance.
14. To avoid the danger of fire, use a \_\_\_\_\_ instead of a bunsen burner to heat flammables.
15. Describe a proper bunsen burner flame: \_\_\_\_\_ with \_\_\_\_\_.
16. Always keep your work area \_\_\_\_\_.
17. List three examples of special heating techniques: \_\_\_\_\_, \_\_\_\_\_ & \_\_\_\_\_.
18. Different chemicals have different \_\_\_\_\_ or temperatures at which they will ignite.
19. List FIVE different safety features of the lab in the video: \_\_\_\_\_,  
\_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.
20. The most common fire extinguisher contains \_\_\_\_\_. Describe the three steps in  
its operation: \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

21. Give two cases in which a fire blanket might be used: \_\_\_\_\_ or \_\_\_\_\_.
22. Under what circumstances is the safety shower used? \_\_\_\_\_ (at least 15 minutes).
23. How would a chemical spill into the eyes be treated? \_\_\_\_\_ (at least 15 minutes).
24. \_\_\_\_\_ from broken glassware are among the most common of lab accidents (BURNS ARE WORSE)
25. Before breaking glass tubing, always \_\_\_\_\_ with a \_\_\_\_\_. After cutting, the jagged ends should be \_\_\_\_\_.
26. Before inserting tubing into a stopper, always \_\_\_\_\_.
27. Describe the proper apparatus for heating glassware: \_\_\_\_\_ secured with \_\_\_\_\_.
28. Always dispose of broken glassware in a \_\_\_\_\_.
29. We should be aware that certain chemicals are \_\_\_\_\_ when mixed.
30. List THREE general classes of chemicals to be disposed of \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.
31. Strong acids and bases should be neutralized. Use \_\_\_\_\_ to neutralize an acid.  
Use \_\_\_\_\_ to neutralize a base. (USUALLY, THE ACIDS AND BASES WE USE IN HIGH SCHOOL LABS ARE DILUTE ENOUGH THAT THEY MAY SIMPLY BE DISPOSED OF DOWN THE SINK WITH LOTS OF WATER RUNNING BEFORE AND AFTER.)
32. Volatile liquids \_\_\_\_\_ very rapidly and usually have very \_\_\_\_\_ flashpoints.  
(THESE LIQUIDS ARE GENERALLY PLACED IN A DISPOSAL IN THE FUMEHOOD IN OUR LAB)
33. Remember, after any lab accident, always inform \_\_\_\_\_.

# LAB SAFETY - CHECKLIST

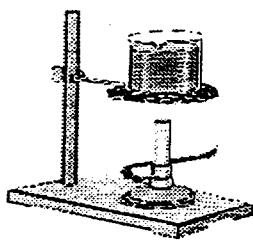
THE FOLLOWING ITEMS SHOULD ALWAYS BE OBSERVED IN A SAFE LAB

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- 1) Noise level is not excessive.
- 2) Tables/desks are arranged such that students may work comfortably and safely.
- 3) Students know why they are doing the experiment (the purpose) and have the procedure in front of them.
- 4) Hot equipment or dangerous chemicals are not being carried through a crowd.
- 5) Injuries (burns, etc.) are reported immediately.
- 6) Students know the position of the nearest fire alarm.
- 7) Students know the position of the nearest fire blanket and/or fire extinguisher and can explain how to use them.
- 8) Students have been given teacher's formal permission to perform experiment.
- 9) Spilled chemicals (liquids or solids) are cleaned up immediately according to teacher's instructions.
- 10) Students can outline the correct operation of the bunsen burner and always operate it safely according to these rules
- 11) Bunsen burners left unattended have been adjusted to an orange, candle-sized flame OR have been turned off.
- 12) Heating test tubes are held on a 30 degree angle, moved back and forth slowly, and the open end is never pointed toward anyone.
- 13) All heated glassware should be PYREX.
- 14) Students test the temperature of heated equipment by bringing the back of the hand near the object.
- 15) ALL students working with heated materials or dangerous liquids are wearing eye protection.
- 16) Students know the location of the nearest eyewash station/water source and are able to explain the procedure for washing contaminated eyes.
- 17) Students wash their hands after every experiment involving chemicals. If any part of the body or clothing has been touched by acid or another harmful chemical, it is flushed thoroughly with cold water.
- 18) Unused chemicals are NEVER returned to the original reagent bottle.



- 19) Solid or dangerous chemicals are NOT placed into the sink. Rather, they are placed in a clearly marked disposal provided by the instructor.
- 20) After emptying SAFE, DISSOLVED CHEMICALS OR ACIDS into the sink, the pipes are flushed thoroughly with water.
- 21) Electrical cords are unplugged by the PLUG, not the cord. Frayed cords or bare wires should be reported to the instructor.
- 22) All used apparatus are cleaned thoroughly (glassware is washed with detergent and rinsed) and returned to its proper place when the experiment is completed.
- 23) Mirrors, metal plates, glassware, etc. with sharp edges is NOT being used. Jagged edges are reported to the teacher.
- 24) Broken glass is reported to the teacher immediately. It is cleaned up and disposed of in a SPECIAL CONTAINER, not in the wastebasket.
- 25) Students are NOT allowed in the storeroom without instructor supervision.
- 26) Any experiments releasing dangerous fumes are performed in the fumehood.
- 27) Students test for odours by waving the fumes gently toward the nose with the hand.
- 28) Students lab tables are clear of unnecessary books, purses, etc.
- 29) Long hair and loose clothing is secured such that it does not present a hazard while working with chemicals or flames.
- 30) Students never use open flames when volatile, flammable liquids such as alcohol or carbon disulphide are being used.



Science Lab Safety Quiz

Name \_\_\_\_\_

Block \_\_\_\_\_

**Directions:** Answer the following 14 questions by filling in the blanks. The quiz is out of 40 marks. Good luck!

1. The best way to leave an unattended bunsen burner is \_\_\_\_\_.  
An alternative, though less acceptable way is \_\_\_\_\_.
2. A student is instructed to find the solubility of sodium nitrate. The student collects a 25 g sample from the reagent bottle at the back bench. Only 15 g of the chemical is used. What should be done with the remaining 10 grams?  
\_\_\_\_\_.
3. The most common injury received in the lab is \_\_\_\_\_.
4. Give one type of fire which should NOT be extinguished with water:  
\_\_\_\_\_. How should this fire be properly extinguished? \_\_\_\_\_.
5. The most important thing to do before beginning a lab is \_\_\_\_\_.
6. Your lab partner has spilled an irritating chemical into his eyes. What do you do?  
\_\_\_\_\_.
7. The name for glassware that may be heated safely is \_\_\_\_\_.
8. Give the FOUR steps (in proper order) in lighting a Bunsen burner:
  - a. \_\_\_\_\_.
  - b. \_\_\_\_\_.
  - c. \_\_\_\_\_.
  - d. \_\_\_\_\_.
9. Give THREE situations for using the fume hood:
  - a. \_\_\_\_\_.
  - b. \_\_\_\_\_.
  - c. \_\_\_\_\_.